SECTION 835
SOLID STATE TIME CLOCK

835.01. DESCRIPTION.

This work shall consist of furnishing materials and installing a solid state time clock in accordance with these Specifications.

835.02. MATERIALS.

This specification sets forth the minimum acceptable design requirements for a single circuit solid state time clock. It is intended for use in traffic control systems and shall be of all solid state construction except for the relay output. All components shall be made available to the purchaser for servicing for five years after expiration of the manufacturer's warranty, or the components shall each be so identified that they may be purchased from industrial electronics suppliers.

Time of day, day of week, date, year and the operation of the relay output shall be easily settable from the integral keyboard. The functions of the keys shall be clearly marked on the keypad. All data required to properly set and program the unit and review the stored program shall be clearly displayed without the use of auxiliary devices.

Changeover from standard time to daylight savings time or vice versa shall be accomplished automatically. This program shall be valid once the unit has been programmed with the time of day, month, date and year in which it is operating. From this entry, at the appropriate time each year, the change will be made automatically. This feature shall be defeatable by a simple hardware and/or software change.

When the user is programming the unit, the display shall provide for verification of each piece of data prior to its being entered. Provisions shall be made for correcting any incorrect data prior to entering it. It shall be possible to alter any individual program step without disturbing any other step in the program.

When an instruction is given to turn the output on or off, that instruction time shall be settable to one minute, and the change shall take place at the zero second of that minute.

The time switch shall be capable of initiating a minimum of six program steps. A program step is defined as the time of day and the day or days of the week at which the output shall be turned on or off.

A set of clear operating instructions shall be furnished with each time switch.

The time switch shall be capable of executing five separate skip plans programmable at least one year in advance.

Programming for the skip plans shall be accomplished through the integral keyboard. Each plan shall be programmed by entering the beginning date (month/day/year) and the ending date for which the output of the time switch will not be activated. The time switch shall be capable of skipping as short a duration as one day or as long as six months. It shall be possible to begin a skip plan in one calendar year and end that same plan in the next consecutive year.

It shall not be necessary to enter the skip plan program in chronological order.

A means shall be provided to review the skip plan program without affecting the normal operation of the time switch. The display shall include the skip plan number, the beginning date and the ending date.

In addition to the skip plan as described above, the time switch shall also be capable of providing a one day skip. The programming of this one day skip may be entered at any time during the six days prior to the day that is to be skipped. After the execution of the one day skip, the time switch will automatically reset and resume normal operation.

A means shall be provided to maintain timekeeping and the program when the line power source (115 volt AC) is temporarily interrupted. This backup system shall maintain timekeeping and all programmed steps intact for not less than 48 hours at 77°F (25°C) when fully charged and shall go on line automatically upon failure of the line power. Upon resumption of the line power, the unit shall automatically resume normal operation and begin recharging the backup system. The charging system shall be capacitive. Batteries will not be accepted.

Should the program of the time switch be erased during an AC power outage, the unit shall display an indication of the program loss. The display shall be a discrete LED indicator and shall be resettable from the integral keyboard.

When the time switch is operating on the backup system, the displays shall be blanked and the output disabled to conserve backup power.

Integral with the time switch shall be a clear display of the time of day, day of week, date and the condition of the output relay. If time is kept on a 12 hour format, provisions shall be made to display AM/PM. The unit shall have the ability to switch to an alternate display of time that includes seconds. A single keystroke shall be all that is necessary to switch to this display or to return to the normal display.

A means shall be provided to review the program on the clock memory and such means shall be integral with the input. Such program review shall not affect the current operation of the time switch.

The time switch backpanel shall be equipped with a means for mounting to a suitable backplate. Mounting holes that provide clearance for at least a No. 10 screw will be acceptable.

The time switch shall not exceed 4 inches (100 mm) x 7 3/8 inches (190 mm) x 3 1/8 inches (80 mm) (WxHxD). A cover shall be provided to protect the time switch from dust. The cover shall fasten securely to the unit and must be easily removable for access to the field wiring terminals. The cover need not be raintight since the time switch will be installed in an existing aluminum cabinet.

Interface to the power line and to the controlled device shall be provided by means of a terminal block capable of terminating wire sizes ranging from #20 to #12 AWG.

The time switch shall operate on a nominal 115 volt AC, 60 Hz power source and shall operate satisfactorily between 95 and 135 volt AC and from -30°F to 160°F (-1°C to 71°C).

Timing shall be synchronous with the power line when such power is available. When commercial power is lost, the timeing shall be maintained by a backup power source. Timing accuracy during such backup operation shall be ±3 seconds per 24 hour period throughout its full temperature range.

No time shall be gained or lost during changeover from 115 vold AC to the backup system and back to 115 volt AC.

All programming shall be accomplished via a keyboard which is an integral part of the unit.

The time of day shall be accurately settable to one second.

835.04. CONSTRUCTION METHODS.

Mount the solid state time clock in a controller cabinet and wire it for operation.

835.05. METHOD OF MEASUREMENT.

The *solid state time clock* will be measured by the unit complete in place.

835.06. BASIS OF PAYMENT.

The accepted solid state time clock, measured as provided above, will be paid for at the contract unit price as follows:

SOLID STATE TIME CLOCK ..... EACH

Such payment shall be full compensation for furnishing materials, labor, equipment, and incidentals necessary to complete the work as specified.

SECTION 836
REGULATORY OR WARNING SIGN WITH FLASHERS

836.01. DESCRIPTION.

This work shall consist of furnishing and installing either regulatory or warning sign assembly with flashing beacons in accordance with these Specifications in reasonably close conformity with the location and dimensions as shown on the Plans or established by the Engineer.

836.02. MATERIALS.

The regulatory or warning sign assembly shall consist of the sheet aluminum sign with the message as specified, the traffic signal heads, solid state flashing controller with time clock, sign post, foundation, wiring and conduit as shown on Std. Drawing RWFS-1 (Latest Revision).

(a) **Sign**. The sign material and fabrication shall be in accordance with Section 850 of these Specifications.

(b) **Solid State Flashing Controller.** The solid state flasher controller shall be a Type 1 or 11 as shown on the Plans and in accordance with Section 827 and Section 835 of these Specifications.

(c) **Flasher Beacons.** The flasher beacons shall consist of traffic signal heads and lamps, of the size specified on the Plans, in accordance with Section 831 of these Specifications.

(d) **Sign Post, Footing and Mounting Hardware.** The sign post and foundation shall be of the size, length and type specified on the Plans, in accordance with Section 831 of these Specifications. Mounting hardware shall be either galvanized, aluminum or stainless steel.

(e) **Aluminum Base.** The cast aluminum base shall be FHWA approved.